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Assessing impact of aerosol intercontinental transport on regional air quality and climate: What satellites can help

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Mounting evidence for intercontinental transport of aerosols suggests that aerosols from a region could significantly affect climate and air quality in downwind regions and continents. Current assessment of these impacts for the most part has been based on global model simulations that show large variability. The aerosol intercontinental transport and its influence on air quality and climate involve many processes at local, regional, and intercontinental scales. There is a pressing need to establish modeling systems that bridge the wide range of scales. The modeling systems need to be evaluated and constrained by observations, including satellite measurements. Columnar loadings of dust and combustion aerosols can be derived from the MODIS and MISR measurements of total aerosol optical depth and particle size and shape information. Characteristic transport heights of dust and combustion aerosols can be determined from the CALIPSO lidar and AIRS measurements. CALIPSO lidar and OMI UV technique also have a unique capability of detecting aerosols above clouds, which could offer some insights into aerosol lofting processes and the importance of above-cloud transport pathway. In this presentation, I will discuss our efforts of integrating these satellite measurements and models to assess the significance of intercontinental transport of dust and combustion aerosols on regional air quality and climate.